q 15 Proofs !!

$(n+1)^2 - n^2 = 2n+1$

$(n+1)(n+1) - n^2 = 2n+1$

$n^2+1n+1n+1-n^2 = 2n+1$

$n^2+2n+1-n^2 = 2n+1$

$2n+1 = 2n+1$

LS = RS

Sep 21-9:33 AM

Functions Worksheet
MCF 3M
Unit One
Mr. Cordick

Knowledge and Understanding

Identify the choice that best completes the statement or answers the question.

1. For which pair of related quantities would time be the independent variable?
   a. grade, time spent on project
   b. length of race, finish time
   c. flight time, rainfall
   d. distance to work, commute time

2. Sylvia owns a harbor cruise company. There must be a life vest for each passenger on a boat. A life vest cost $28.00. The number of passengers is represented by p. The total cost of outfitting a boat with life vests can b represented by the function $f(x)$. What is the cost of outfitting 3 boats that can hold 70 passengers each?
   a. $84
   b. $1960
   c. $1963
   d. $5880

3. Evaluate $f(6)$ for $\{(0, 6), (3, 12), (6, 54), (2, 6)\}$.
   a. 0
   b. 2
   c. 6
   d. 54

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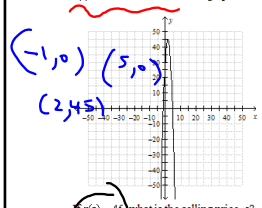
4. The relation between the selling price of a toothbrush and revenue, $r(s)$ is represented by the function $r(s) = -5s^2 + 20s + 25$ and its graph below.



$45 = -5s^2 + 20s + 25$

$0 = -5s^2 + 20s + 25 - 45$

$0 = -5s^2 + 20s - 20$

$0 = -5(s^2 - 4s + 4)$

$0 = -5(s-2)(s-2)$

-4 | +4

-2 -2

If $r(s) = 45$, what is the selling price, s?
a. $0
b. $1
c. $2
d. $20

5. For a function $f(5) = -1$, what does $f(5)$ represent?
   a. The x-coordinate of the point
   b. The y-coordinate of the point
   c. The constant in the equation
   d. The domain of the function

6. The sum of two whole numbers is 16. Their product can be modelled by the function $g(x) = x(16 - x)$. What is the largest product?
   a. 8
   c. 63

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7. Which equation describes a parabola that opens downward, is congruent to $y = x^2$, and has its vertex at (0, 3)?
   a. $y = (x+3)^2 - 1$
   b. $y = -x^2 + 3$
   c. $y = -(x-3)^2$
   d. $y = x^2 + 3$

8. List the sequence of steps required to graph the function $f(x) = -(x+4)^2 - 6$
   a. horizontal translation 4 units to the right, vertical compression by a factor of 1, vertical translation 6 units down
   b. horizontal translation 4 units to the right, reflection in x-axis, vertical translation 6 units down
   c. horizontal translation 4 units to the left, vertical translation 6 units up, reflection in x-axis
   d. horizontal translation 4 units to the left, reflection in x-axis, vertical translation 6 units down

9. A stonewashed jean company has determined the cost in dollars (c) per tonne of stones mined is given by $c(x) = 0.2(x-5)^2 + 7$, where x is the number of tonnes of stone. How does the vertex of the parabola of the function compare to the vertex of $f(x) = x^2$
   a. down 5 units and right 7 units
   b. up 7 units and left 5 units
   c. up 7 units and right 5 units
   d. up 5 units and right 7 units

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9. A stonewashed jean company has determined the cost in dollars (c) per tonne of stones mined is given by $c(x) = 0.2(x-5)^2 + 7$, where x is the number of tonnes of stone. How does the vertex of the parabola of the function compare to the vertex of $f(x) = x^2$
   a. down 5 units and right 7 units
   b. up 7 units and left 5 units
   c. up 7 units and right 5 units
   d. up 5 units and right 7 units

10. Which equation of a parabola satisfies the set of conditions?
    opens downward
    congruent with $y = \frac{1}{4}x^2$
    vertex (2, 5)
   a. $y = -\frac{1}{4}(x-2)^2 + 5$
   b. $y = \frac{1}{4}(x+2)^2 + 5$
   c. $y = -\frac{1}{4}(x+2)^2 - 5$
   d. $y = \frac{1}{4}(x-2)^2 + 5$

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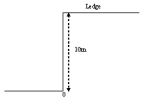
Communication

11. Leon is trying to land a pebble on a rock ledge that is 10 metres above. The height of the pebble, in metres, can be modelled by the function $h(t) = -5t^2 + 16t + 1$, where t is the time in seconds. In about how many seconds will the pebble land on the ledge?



$10 = -5t^2 + 16t + 1$

$0 = -5t^2 + 16t + 1 - 10$

$0 = -5t^2 + 16t - 9$

A | M

+16 | +45

12. Identify the transformations to the function $f(x) = 2(x-4)^2 - 3$

t	$h(t)$
0	1
1	12
2	13
3	4

$h(t) = -5t^2 + 16t + 1$

$h(0) = -5(0)^2 + 16(0) + 1$

$h(2) = -5(2)^2 + 16(2) + 1$

$h(3) = -5(4) + 32 + 1$

$h(3) = -20 + 32 + 1$

$h(3) = 13$

$f(x) = x^2$ $f(x) = a(x-h)^2 + k$

$f(x) = 2(x-4)^2 - 3$

Stretched by 2

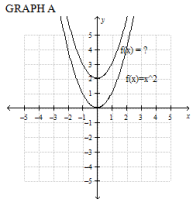
horizontally translated 4 units right

vertically translated 3 units down

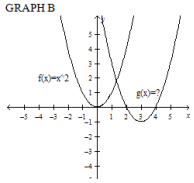
Sep 21-8:42 AM

13.Name a function to describe each graph.

GRAPH A



GRAPH B



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$R = \{g(x) \leq R\}$

$D = \{x = 1\}$

14. For a given function , the range is the set of real numbers and the domain is the value of x. What kind of function is ?

15. The surface area of a cube can be modelled by the function . Why must the domain be greater than or equal to 0?

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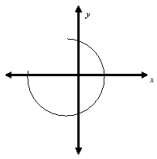
Thinking and Inquiry

16. Kim said the relation shown on the graph is a function because it passes the vertical line test. Is she correct? Explain your answer with words and pictures.



17. Andrea said the function shown in the table is quadratic. Is she correct? Explain.

Time (min)	0	1	2	3	4	5
Volume (L)	0	24	75	226	675	2023

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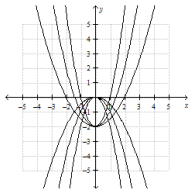
18. If $y = x^2$ is the base curve for the graphs shown, what equations could be used to produce the screens on a graphing calculator?



$x^2 - 2$ $-x^2$

$2x^2 - 2$ $-2x^2$

$3x^2 - 2$ $-3x^2$

19. Draw two graphs of a quadratic function and a linear function with a domain of $D = \{x \geq 0 | x \in \mathbf{R}\}$ and a range of $R = \{y \leq -2 | y \in \mathbf{R}\}$.

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Sep 14-7:25 AM